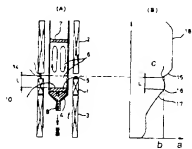


**(54) PRODUCTION OF SINGLE CRYSTAL AND DEVICE THEREFOR**

- (11) 5-124887 (A) (43) 21.5.1993 (19) JP  
 (21) Appl. No. 3-290064 (22) 6.11.1991  
 (71) HITACHI CABLE LTD (72) SEIJI MIZUNAWA  
 (51) Int. Cl. C30B11/00, C30B29/42, H01L21/208

**PURPOSE:** To improve the yield of the single crystal and to increase a growth rate by shutting off the convection of the melt from a solid-liquid boundary so as to form the solid-liquid boundary to a shape having a convex face toward the melt direction.

**CONSTITUTION:** The heater of an electric furnace consists of a heater 1 for controlling the solid-liquid boundary position, a heater 2 for forming the melt, and a heater 3 for preventing the rapid cooling of an ingot. These heaters are kept at 1245 to 1250°C or 1150 to 1200°C near the respective m.p. (m.p.=1238°C). The heater 1 for controlling the solid-liquid boundary position and the heater 2 for forming the melt are parted from each other to provide a spacing 14, by which the valley  $T_v$  (= about 1233 to 1237°C) of temp. is formed and the temp. gradient between the valley of the temp. and the solid-liquid boundary 10 is substantially maintained at 0°C/cm. As a result, the convection in the melt is shut off at above and below the solid-liquid boundary 10 does no longer receive the influence of the convection.



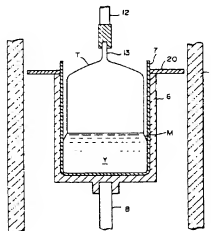
4: crucible, 3: GaAs single crystal, 6: GaAs melt, 15: high temp. region, 16: boundary temp. region, 17: low temp. region, 18: temp. distribution in furnace, 14: m.p. (crystal m.p.), 13: temp. valley of temp. distribution, 1c: spacing dimension

**(54) SINGLE CRYSTAL PULLING UP DEVICE**

- (11) 5-124888 (A) (43) 21.5.1993 (19) JP  
 (21) Appl. No. 3-229132 (22) 9.9.1991 (33) JP (31) 91p.59229 (32) 22.3.1991  
 (71) MITSUBISHI MATERIALS CORP(1) (72) KOICHI SASA(2)  
 (51) Int. Cl. C30B15/10

**PURPOSE:** To obtain the single crystal which has high cylindricity and dislocation defects by generating a positive temp. gradient outwardly in a radial direction atop the melt in a crucible, thereby improving the effect of controlling the crystal shape by meniscus.

**CONSTITUTION:** This device has a cylindrical hermetic vessel 1 which is hermetically sealed in the inside space, the crucible 7 which is disposed in the hermetic vessel, a susceptor 6 which holds this crucible 6, a crucible rotating means 8 which rotates this susceptor 6, a heating means which heats the hermetic vessel 1, and a pulling-up mechanism 12 which immerses a seed crystal into the raw material melt Y in the crucible 7 and pulls up the single crystal T. A toric collar part 20 for shielding which extends outwardly in the radial direction and has the outside diameter smaller than the inside diameter of the hermetic vessel 1 is provided in the susceptor 6.

**(54) QUARTZ GLASS CRUCIBLE FOR PULLING UP SILICON SINGLE CRYSTAL AND ITS PRODUCTION**

- (11) 5-124889 (A) (43) 21.5.1993 (19) JP  
 (21) Appl. No. 3-349292 (22) 31.10.1991  
 (71) SHINETSU QUARTZ PROD CO LTD (72) FUJIO IWATANI(2)  
 (51) Int. Cl. C30B15/10, C30B27/02, C30B29/06

**PURPOSE:** To provide the quartz glass crucible, the wall surfaces of which are less expandable and deformable under a reduced pressure and heating, i.e., have excellent durability and good soaking characteristics and which is usable over a long period of time and the process for production of thereof which can inexpensively produce such quartz glass crucible.

**CONSTITUTION:** This crucible for pulling up a silicon single crystal has the inside surface which is formed of a transparent layer and the outside surface which is formed of a foam-contg. layer. The above-mentioned transparent layer is a transparent layer subjected to a hydrogen heat diffusion treatment. Such crucible is produced by producing the quartz glass crucible, the inside surface of which is formed of the transparent layer by an arc rotational melting method and by heating the inside surface of the quartz glass crucible produced in such a manner for 0.5 to 5 hours at 300 to 1200°C in hydrogen or hydrogen contg. atmosphere

